

MEMORANDUM

To: Board of Regents
From: Board Office
Subject: Post-Audit Report of the Master of Science in Agronomy Distance Education Program, Iowa State University
Date: January 6, 2003

Recommended Action:


Refer the Post-Audit Report of the Master of Science in Agronomy major at Iowa State University to the Board Office and the Interinstitutional Committee on Educational Coordination (ICEC) for review and recommendation.

Executive Summary:

Complies with Board Policy Iowa State University has submitted a post-audit report on the Master of Science in Agronomy major as required by Board of Regents policy (*Policy Manual §6.07*). This policy requires that the universities provide a status report on all new programs five years after initial approval by the Board.

To be Reviewed by Board Office and ICEC A preliminary review of the report indicates that the program appears to satisfy the Board's post-audit requirements. The report will be further reviewed by the Board Office and the ICEC; the results of those reviews will be reported later to the Board of Regents.

Regent Post-Audit Questions The University's responses to the Board of Regents Post-Audit Questions are attached to this memorandum.


Robert J. Barak

Approved: 
Gregory S. Nichols

Regents Post-Audit Review Questions

Program Title: Master of Science in Agronomy

Administrative Unit: Department of Agronomy

College: Agriculture

Introduction

The Master of Science in Agronomy is a comprehensive distance education program serving professionals in crop, soil and environmental sciences. It is unique from many distance education programs in that it was designed for a specific population of distance learners. Our students are primarily individuals working in agronomy-related fields in industry or government who need additional training for professional advancement. The program is offered at a distance to make it accessible to students who would otherwise be unable to pursue an advanced degree. The curriculum integrates soil science, climatology, crop science, and pest management into a carefully coordinated plan of study designed specifically for the professional agronomist. Instruction is delivered using browser-based interactive courseware available on CD-ROM or over the Internet. Students interact with instructors and each other by electronic mail, discussion groups, and chat rooms.

The curriculum consists of 27 credit units of course work and a 3-credit creative component. The courses have been designed and scheduled so that it is possible to complete the degree within a two-year period. However, most students require a longer period because of the time commitment required. The first-year curriculum emphasizes basic knowledge and application in the agronomic sciences including crop management, soil management, agricultural meteorology, and integrated pest management. These subjects are covered in a series of seven 2-credit courses that have been designed to provide students from diverse backgrounds with an advanced understanding of agronomic principles. The second year of the program focuses on development of problem-solving and professional skills. Students are required to develop and complete a professional development project or creative component, which involves creative thinking and analysis relevant to their careers.

Instruction in the program began with the enrollment of 15 students in a pilot program offered in the 98/99 academic year. Enrollment was opened to all qualified applicants in the fall of 1999. Currently there are over 100 students that have been admitted to the program, accounting for about one-half of the students in graduate programs in the Department of Agronomy and one-sixth in the College of Agriculture. The last two courses developed for the program were completed in spring 2001. Seven students have graduated from the program since then.

1. Program Availability

- a. Is this program now available in other Regent universities or in other colleges and universities in Iowa? No
- b. If so, has the availability of other similar programs changed in the last five years? Do existing programs in Iowa have the capacity to meet student demand and the demand for graduates? NA
- c. What are the similarities and differences among programs in this general area at Iowa institutions? What distinguishes this program from similar programs at other Iowa institutions? NA
- d. What interactions are there between this program and similar programs at other Iowa institutions? NA

2. Enrollment

a. Enrollment

Over one hundred students have been admitted to the program since instruction was initiated in 1998 making the program by far the largest graduate program in the College of Agriculture. During the past two academic years about 60 Agronomy MS students were actively enrolled in classes during the fall semester. This compares to a total of 111 students for all MS students enrolled in graduate programs in the Department of Agronomy and 273 MS students enrolled in graduate programs in the College of Agriculture in the fall of 2001.

Enrollment in Agronomy MS courses is limited to 20 students in order to maintain an instructor - student ratio appropriate for graduate studies. Numbers greater than this adversely affect communication between the instructor and individual students and decrease the effectiveness and quality of instruction. Students admitted to the Agronomy MS program have first priority for enrollment in courses taught as part of the curriculum. Students admitted to other ISU graduate programs may enroll in Agronomy MS courses on a space available basis.

	Year 1	Year 2	Year 3	Year 4	Current Year	Year 6	Year 7	Year 8
1) Total majors in program (fall semester enrollment)	NA	12	21	62	59	65	70	75
2) Non-major enrollment in program courses (fall and spring semesters).	NA	NA	NA	7	9	10	10	10

3) Number of Iowa residents and other students who have enrolled in the program.

The program is currently open to qualified students residing in the US and Canada. Out of 106 students currently considered active in the program, 53 reside in Iowa, 50 in 22 other US states, and 3 in 3 Canadian provinces. There is interest in opening the program to international students. However, this will be done only when economic and logistical constraints are resolved.

4) If the actual enrollment figures for the last four years differ markedly from those projected in the original program proposal, indicate the factors which may have led to the disparity.

The original program proposal greatly underestimated enrollment in the program. Instead of the estimated participation of 30 students, the program has averaged 60 for the past two years. The original estimates were based on a survey of former ISU undergraduates in agriculture and did not account for interest from students that did their undergraduate studies elsewhere.

b. Dropouts

1) How many "dropouts" can be identified for this program over the last five years?

Year 1	Year 2	Year 3	Year 4	Current Year
NA	1	4	4	0

2) What reasons were given by "dropouts" for leaving the program?

The most common reason given for dropping out of the program was a change in personal circumstances. This is to be expected since most of our students work full time in their profession and many have family commitments as well. Specific personal circumstances cited included changes in job responsibilities and family health issues. One student indicated that he did not possess the organizational skills necessary to complete the program.

3. Graduation and Placement Information

a. Indicate the number of graduates of the program each of the previous four years and estimate the number that will complete the program this year and each of the next three years.

Year 1 - 0	Current Year - 3
Year 2 - 0	Year 6 - 10
Year 3 - 0	Year 7 - 15
Year 4 - 3	Year 8 - 20

b. To what extent have graduates been successful with respect to certification and/or licensure (if applicable)? NA

- c. Estimate placement of program graduates for each of the past five years (by percentage of total graduates for each year).

	Year 1	Year 2	Year 3	Year 4	Current Year
Further study in graduate or professional school					
Employed in field or related field				100	100
Employed in non-related field					
Unemployed					
Unknown					

- d. To what extent have graduates been successful in obtaining the preferred first job?

Nearly all students enrolled in the program work full time in their chosen profession and participate in the program on a part-time basis. Several have indicated that participation in the program is viewed favorably by their employer and will open opportunities for advancement. Other students have changed jobs and relocated to other states during their participation in the program.

- e. Indicate the employment (placement) experiences of the graduates of the program.

See answer to d above.

4. Accreditation Status

Is an accreditation process available in this field of study? If so, what is the accreditation status of the program? NA

5. Staffing

Outline the previous and current FTE staffing of the program and estimate future staffing needs for the next three years.

	Year 1	Year 2	Year 3	Year 4	Current Year	Year 6	Year 7	Year 8
Faculty	NA	0.55	1.25	2.00	2.25	2.25	2.25	2.25
Graduate Assistants	4.50	5.00	4.00	4.25	4.0	4.0	4.0	4.0
Other Staff	NA	0.58	1.25	1.92	1.42	1.08	.91	0

6. Expenditures

Outline the increases in expenditures that resulted from the adoption of this program, as well

as estimate the increases which will occur over the next two years.

	Year 1	Year 2	Year 3	Year 4	Current Year	Year 6	Year 7
Faculty	26,246	173,286	173,120	176,784	203,369	177,948	152,527
Graduate Assistants	62,520	75,374	54,121	59,303	55,459	58,232	61,144
Other Staff	33,987	37,852	44,012	45,647	47,108	49,463	51,937
General Expense (Excluding computer use)	22,549	19,963	24,455	37,243	33,278	34,942	36,689
Equipment	3,889	19,867	27,867	8,409	11,025	11,576	12,151
Library Resources	-	-	-	-	-	-	-
Space Needs (amt. & cost of new space and/or remodeled space)	-	-	-	-	-	-	-
Computer Use	100	311	560	474	833	875	918
Other Resources (please explain)	22,549	19,963	24,455	37,243	33,278	34,942	36,689
TOTAL	171,840	346,616	348,590	365,103	384,350	367,978	352,055

7. Projected versus Actual

The program has cost considerably more to implement than was projected in the original proposal. However, all additional costs of the program have been covered by trust and endowment funds received by the Department of Agronomy. Much of the additional cost was spent on salaries for adjunct faculty that were hired to assist tenured faculty in the development and instruction of courses. Our original intention was for this work to be carried out by existing tenured faculty. However, the workload required to develop and instruct thirteen additional courses was greater than could be addressed by existing faculty without negatively impacting other departmental programs. The department is committed to moving as much of the expense of the program as possible from endowment funds to other sources over the next three years. The goal is to transfer all instructional costs to state or other funds by reassigning teaching responsibilities to tenured faculty. Other program costs will be recouped through tuition and fees.

8. Supporting Materials

Appendix A: Final version of the Master of Science in Agronomy proposal approved by the Board of Regents in 1997.

Appendix B: Master of Science in Agronomy program report, 1995-99.

Appendix C: Master of Science in Agronomy annual report, 2001.

Appendix D: Master of Science in Agronomy evaluation report executive summary, 2002.

PROPOSAL FOR A MASTER OF SCIENCE IN AGRONOMY PROFESSIONAL DEGREE PROGRAM

A. Background Information

1. Proposed major: Agronomy
2. Degree: Master of Science
3. Departments involved

Department of Agronomy, originator and lead
Department of Plant Pathology, curriculum support
Department of Entomology, curriculum support

4. Need for proposed program

The paradox for Agronomy is a declining number of job opportunities for graduates with highly specialized training and yet an increasing demand for students with advanced training in general agronomy. The nature of the student population is also changing. There is a large and increasing number of individuals working in an agronomy-related field in either industry or government who need additional training for professional advancement. These individuals are often unable to pursue an advanced degree because employment and family commitments preclude their returning to school.

The need for an alternative graduate program to meet the educational needs of these persons was recognized in the College of Agriculture's strategic plan (**Entering the 21st Century: Planning for Progress**, p. 8) which states that "there is an increasing pool of nontraditional students who require courses at night and on weekends, both on-and off- campus" and "the job market for ... Ph.D. programs is shrinking. Employers, however, indicate a need for more specialists (past the B.S. but possibly not a research degree)." This latter point was made clear in the comments of Dr. Paul Carter of Pioneer Hi-Bred International, Inc. in a paper presented at the American Seed Trade Association in 1995. When commenting on the future role of universities Dr. Carter stated "Optional graduate programs should be developed specific to needs of company field agronomists and crop consultants. These should emphasize communication skills, field crop diagnostics, and business skills, with less than the traditional focus on research." He went on to say that "Access to convenient and relevant continuing education and on-the-job graduate programs for field agronomists should be developed. Convenience could be enhanced by using emerging distance learning techniques."

A survey was conducted by the Department of Agronomy in 1995 to assess the potential market for a professional M.S. a degree offered at a distance. The survey instrument was distributed to over 3000 ISU graduates residing in Iowa who graduated with a B.S. degree in an

agronomy-related field since 1980. The survey was divided into five sections which were designed to gather personal information, gauge general interest in an advanced degree, find out if the proposed delivery format is acceptable, identify subject matter interest, and provide an opportunity for written comments. Returns were disqualified if the respondent had already received a graduate degree, listed an undergraduate major outside the target population, or received their B.S. degree prior to 1980. There were over 700 responses to the survey of which 617 were qualified. Over 90% of the qualified respondents graduated with a B.S. degree in one of three areas; ag business, general agriculture or agronomy. The present occupation listed most often was farming (212) followed by seed industry (81) and government agency (57). Seventy-four percent of the respondents agreed with the statement that "there are many career opportunities available to individuals with advanced training in agronomy" while 57% indicated interest in pursuing the degree if it were made available. A full 84% of the respondents indicated that the use of multimedia computer technology would be an acceptable method of course delivery although many (74%) indicated that some direct interaction with instructors and some hands-on laboratory activities would be important to them. When asked to rate a number of subject matter areas as to their importance, they listed the traditional agronomic areas of crop and soil management, and crop protection as being very important. However, they considered management, communications, and computer skills as being equally important relative to advanced training in agronomy.

5. Objectives of proposed program

The objective of the curriculum is to provide a broad background in agronomy and related disciplines to prepare individuals for advancement in industry and government. While the current M. S. degree is specialized and emphasizes research, the professional degree program is more global and emphasizes application and problem solving. The curriculum is designed to produce graduates with a competency level intermediate to the current B.S. and Ph.D. degree programs in Agronomy.

6. General description of program

The curriculum will consist of four 6-credit units, one 2-credit unit, one 1-credit workshop, and a 3-credit creative component. Assuming continuous enrollment, a student would be able to complete the degree within a two year period. The first-year curriculum will emphasize technical knowledge and application in three areas: 1) crop management, 2) soil and water management, and 3) integrated pest management. These subjects will be covered in a series of two 6-credit units and one 2-credit unit. Subject matter will be addressed using a systems, rather than the traditional disciplinary, approach. Students completing the first year of the program will be prepared to take the Certified Crop Advisor (CCA) exam. The second year of the program will focus more on development of problem-solving and professional skills. Each student will be required to develop and complete a professional development project as a creative component which will be initiated the summer before the second year and completed the following summer. The creative component will take the form of in-depth analysis of a given problem or topic culminating in a specific set of

conclusions or recommendations. The intention is to provide a graduate-level exercise in creative thinking and analysis relevant to the student's career.

To make the degree accessible, a substantial portion of the curriculum will be delivered to students using multimedia technology over an asynchronous learning network. Information traditionally delivered to students via lecture, will instead be delivered through interactive courseware. Students will access the courseware by computer from home or their place of business. Using this approach, students can study at their convenience and it is not necessary to arrange meeting times for the entire class. Although students will be able to study when and where their schedule permits, they will be expected to make satisfactory progress within the time allotted for the course. Students will interact with the instructor and other students by E-mail, video conference, and at prearranged meetings on and off campus.

The courseware for each unit will be contained on a CD-ROM. It will be developed using an interactive multimedia authoring language. Using this approach it will be possible to use color photos, video, audio, and animation as well as text to present information. It is also possible to make remedial information available to students requiring it, and advanced topics can be added for students who desire to learn more. In addition to the courseware, links to other computer resources will be provided through a dedicated computer network. Through this network students will have access to all of the resources available on the Internet and will be able to communicate with instructors and each other by E-mail. Telephone support will also be provided.

Each student's progress will be monitored through a series of quizzes over the material covered in each learning module. The students will access quizzes over the network using a password. In order to complete the course they will need to have a passing grade on each quiz and a final exam. The final exam will be proctored on campus or by arrangement with ISU employees out in the state. An entrance exam will be administered to students entering the program for diagnostic purposes. This will be used to discover any deficiencies in preparation so that remedial action can be taken and as a baseline to monitor the effectiveness of the degree program.

7. Comparison of the proposed program

(a) with standards established by accrediting associations

There are no accrediting associations in Agronomy. However, the proposed program meets all general accrediting requirements for university degrees.

(b) with similar programs at other universities.

The degree program represents a new major under the existing master of science degree offered in agronomy. Several institutions offer a general non-thesis degree in agronomy at the masters level. However, this will be the first masters degree program in agronomy that is designed to be delivered at a distance using asynchronous learning technology.

8. Program requirements:

(a) prerequisites

A passing grade (C or better) in the following courses or their equivalent:

Agronomy 114: Principles of crop production (3 credits)

Agronomy 154: Fundamentals of soil science (3 credits)

Biology 109: Introductory biology (3 credits)

Chemistry 163: General chemistry (4 credits)

Math 140: Fundamentals of algebra for science and higher mathematics (3 credits)

Statistics 104: Introduction to statistics (3 credits)

Prerequisites were limited to those considered essential in recognition that many potential clients for the degree program will not have majored in agronomy as undergraduates. Generally, students who have completed a degree from the College of Agriculture will have satisfied these requirements.

(b) language requirements

No foreign language is required for the major.

(c) courses and seminars presently available for credit toward the program

Agronomy 593: Workshop in Agronomy (1 credit)

Agronomy 599: Creative Component (3 credits)

(d) proposed new courses

Agronomy 501: Agronomic Systems Technology I (6 credits). Soil, crop, and pest management for establishment and juvenile phases of crop growth.

Agronomy 502: Agronomic Systems Technology II (6 credits). Soil, crop, and pest management for vegetative and reproductive phases of crop growth.

Agronomy 503: Agronomic Systems Technology III (2 credits). Harvest and post-harvest management of agronomic crops.

Agronomy 591: Advanced Agronomic Systems I (6 credits). Agroecosystems, environmental conservation, and natural resource management.

Agronomy 592: Advanced Agronomic Systems II (6 credits). Professional skill development, professional ethics, and emerging technologies.

(e) thesis options

A thesis is not required for the major.

(f) implications for related areas in the university

The program most likely to be affected by a professional agronomy degree program is the interdepartmental Master of Agriculture degree. The agronomy degree will differ from the Master of Agriculture by having a very structured curriculum that is specific to the discipline of agronomy.

(g) admission standards for graduate programs

To be admitted to the professional M.S. degree program students will be required to have graduated in the upper one-half of their graduating class with a bachelor's degree from an accredited institution. These are the basic admission standards for all graduate programs as ISU.

9. General description of resources currently available and future resource needs:

(a) faculty members

The program will be developed by a core of ten faculty from agronomy (K. Moore, R. Shibles, L. Burras, A. Campbell, R. Cruse, D. Farnham, A. Knapp, M. Owen, and E. Taylor). The Departments of Plant Pathology and Entomology have agreed to provide instructional support for the program in integrated pest management. Faculty from Plant Pathology and Entomology will be provided resources to support their involvement.

(b) effects on work load of present staff

The proportion of each faculty member's appointment allotted to the program will be 20 percent and will be credited to either teaching or extension. Some adjustments in teaching responsibilities of participating faculty are anticipated, but have not yet been determined.

(c) research facilities

No research facilities are needed for the program.

(d) library facilities

No additional library facilities or resources are needed for the program.

(e) supplies, field work, student recruitment

The most significant cost of the program will be that of developing and delivering interactive courseware. The department currently has a grant pending which will fund the first five years of the program including support personnel and equipment.

REGENTS PROGRAM REVIEW QUESTIONS-MAJORS

Master of Science Degree, Major in Agronomy

1. Need

A. How will this proposed program further the educational and curriculum needs of the students in this discipline?

The program is designed to meet the educational needs of professionals working in an agronomy-related field who need or desire additional training for career advancement. The scope of the degree is broad, integrating the disciplines of soils, climatology, and crops into a carefully coordinated curriculum. The degree will be made accessible to students off campus by use of asynchronous learning technologies so that they can continue working in their present occupation while pursuing advanced training.

B. How does it further the educational and curriculum needs of other units in the college of university?

Courses developed for the curriculum are specific to the degree program and will not be immediately available to students in other degree programs. However, significant portions of the multimedia course ware developed for this program may be useful in other educational activities.

2. A. What programs in this field of study are available in other colleges and universities in Iowa?

No other institution in the state offers a M. S. degree program in agronomy.

B. With what representatives of these programs have you consulted in developing this proposal?

N/A

C. In what way is this proposed program similar to those mentioned in A?

N/A

D. How does the proposed program supplement the current programs available?

N/A

E. Has the possibility of some kind of interinstitutional program or other cooperative effort been explored?

No such program has been explored at this time. However, there may be opportunities for collaboration with community colleges in delivery of certain components of the degree program.

3. Estimated Enrollments

Anticipated enrollment is approximately thirty students per year once the program is established. This estimate is based upon a survey conducted in 1995 to assess potential interest in a professional M.S. degree offered at a distance. The program will likely attract students working in agri-business and government agencies.

4. Please provide any available information on employment opportunities available to graduates of this program in Iowa and nationally.

Employment opportunities for individuals with post-baccalaureate training in agronomy appear to be good based upon survey results and discussions with potential employers. There are no employment statistics available for professional degree programs in agronomy. Employment opportunities for graduates with traditional M. S. degrees in agronomy have been good and are increasing relative to opportunities for Ph.D. graduates. There are approximately 6,000 certified crop advisors working in the state of Iowa, a large proportion of which could presumably benefit from an advanced degree.

5. Are there accreditation standards for this program?

There are no accreditation organizations or standards for a professional degree program in agronomy.

6. Does the proposed program meet minimal national standards for the program?

N/A

7. Please report any reactions of the Iowa Coordinating Council for Post-High School Education.

The proposal has not yet been reviewed by the Iowa Coordinating Council for Post-High School Education.

8. Please list the Iowa institutions in which articulation agreements are being developed for the proposed program. N/A

Additional Resource Needs

1. Please estimate the probable marginal increases in expenditure that may be necessary as a result of the adoption of this program for the next three years.

Estimated (incremental) costs¹

	First Year	Second Year	Third Year
A. Faculty	0	0	0
B. Graduate Assistants	54,000	57,000	60,000
C. General Expenses	40,000	40,000	40,000
D. Equipment	33,000	0	0
E. Library Resources	0	0	0
F. Space	0	0	0
G. Computer Use	100	1,200	1,200
H. Other ²	250	1,200	1,200
TOTAL	127,350	99,400	102,400

¹ Costs for each year represent actual costs above current expenditures at the initiation of the program and are not cumulative.

² Estimated telecommunications expenses.

2. Describe the nature and justification for the additional expenses.

Most of the increased marginal expenses for the program are related to the development and delivery of instructional course ware. To offer the majority of the curriculum at a distance using an asynchronous model, it will be necessary to develop computer-based learning modules for each of the expected outcomes. This will be accomplished with the support of an instructional technologist and a group of three program assistants who will work with faculty to develop learning modules. The instructional technologist position has already been funded from the current budget. Once the program is initiated, there will be maintenance costs associated with updating course ware and additional costs associated with delivery and support.

3. How is it anticipated that the additional resource needs will be provided?

Expenses for developing and implementing the program are anticipated to be provided by an external grant. If funded, the grant will provide all development and operating expenses of the program for a period of five years. After that period, the program should be able to recoup all additional operating costs through tuition paid by students enrolled in the program.